PCT

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification [7] : G06F 17/60	**A2**	**(11) International Publication Number:** **WO 00/49543**
		(43) International Publication Date: 24 August 2000 (24.08.00)

(21) International Application Number: PCT/GB00/00596

(22) International Filing Date: 18 February 2000 (18.02.00)

(30) Priority Data:
9903766.5   18 February 1999 (18.02.99)   GB

(71)(72) Applicant and Inventor: WOOD, Jocelyn, Tristram, Gervais [GB/GB]; 82 Merchant's Quay, Salford Quays, Manchester M5 2XG (GB).

(74) Agents: BROWN, Fraser, Gregory, James et al.; fJ Cleveland, 40–43 Chancery Lane, London WC2A 1JQ (GB).

(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
Without international search report and to be republished upon receipt of that report.

(54) Title: DATA PROCESSING SYSTEM FOR INITIATING AND ADMINISTERING FINANCIAL PRODUCTS

(57) Abstract

This invention relates to the field of finance and relates particularly to a method and data processing system for initiating and administering a long term loan. The object of the present invention is to provide a data processing system for initiating and administering an income bonded load which overcomes the disadvantages of the conventional prior art methods. This invention provides an operatively interconnected data processing system for producing and administering an income bonded loan wherein the whole or part of the compensation paid for the use of the funds is repaid by a predetermined percentage of future income rather than by an interest rate whether fixed or variable.

• Overview of Income Bonded Loan Data Processor Flow Diagram
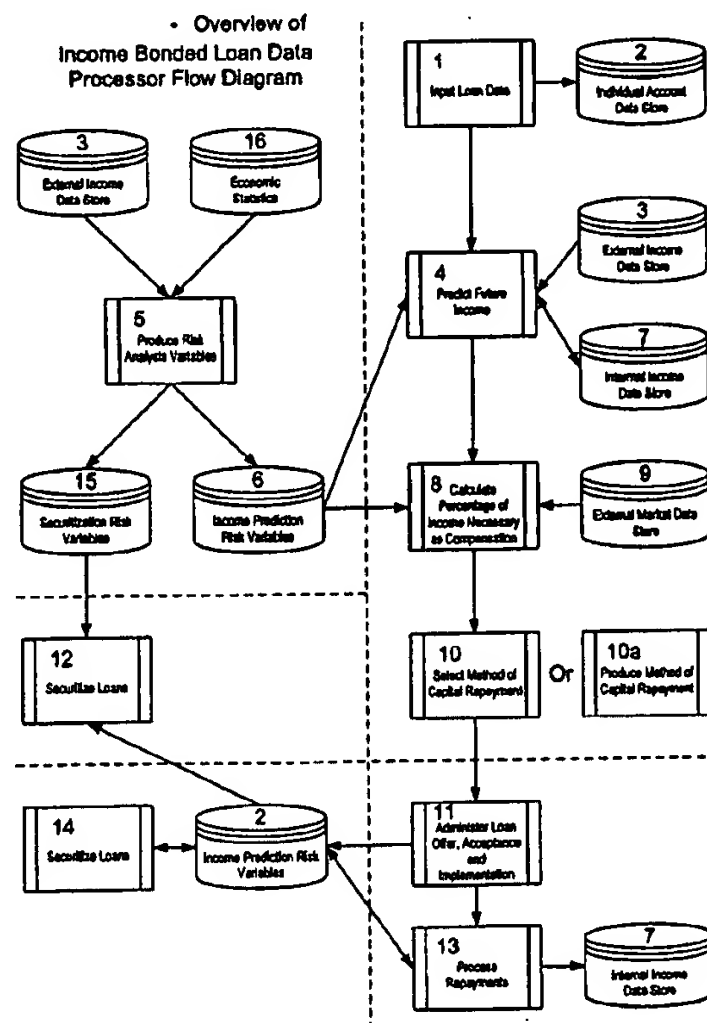
FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav	TM	Turkmenistan
BF	Burkina Faso	GR	Greece		Republic of Macedonia	TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

1

DATA PROCESSING SYSTEM FOR INITIATING AND
ADMINISTERING FINANCIAL PRODUCTS

This invention relates to the field of finance and
relates particularly to a method and data processing
system for initiating and administering a range of
financial products.

The financial services industry provides products with
a wide range of payment characteristics. The mortgage
market alone offers a bewildering variety of products to
satisfy the long term personal debt needs of home owners.
The prior art and problems of this loan industry and the
financial management systems which support it are well
described in US Patent 5,742,775. Essentially there are
two processes used for transferring money from lender to
borrower, debt and equity. Equity is unsuited to consumer
credit, leaving debt as the only borrowing process
available. The present invention provides a third
process, one that is suitable for the consumer credit
market but which exhibits characteristics of both the
debt and equity processes and is thus suitable for
implementation across the financial services industry
including the provision of pensions and savings. One
characteristic of all personal lending products is the
payment of compensation for the use of the funds which
the borrower receives from the lender. This compensation

2

has hitherto been determined by reference to a quoted
interest rate which may be fixed or variable.

There are many problems inherent in this loan
5   compensation process for borrowers. For example, the
amount of the loan is determined by the borrower's
ability to repay the loan interest from current income.
This means that the loan amount is based on the income
in the first period of the loan and not on the income
10   which will be earned over the lifetime of the loan.
Furthermore, the loan repayments generally reduce as a
percentage of the borrower's income over time which means
that loan repayments are a high proportion of income when
the income level is at the lowest point in the loan term
15   and low when the absolute value of the income is likely
to be highest, which means that the borrower is more
likely to suffer hardship early in the repayment
schedule. In addition, repayments are usually subject to
the variability of interest rates making it difficult for
20   an individual to estimate the affordability of long term
debt. Fixed interest loans generally include a premium
to compensate the lender for the increased risk
associated with them over a long period and are thus more
expensive. A major problem for the borrower is that if
25   his or her income should fall significantly for a period
of time, the loan repayments will generally remain at the
same level leading to financial hardship or possibly

3

default and, in the case of a mortgage, repossession of the family home.

The problems inherent in this type of loan are not limited to the borrower. Lenders must protect themselves from the risks of making the loan, and hedging against interest rate fluctuations is expensive and normally related to equity, bond or derivative financial instruments which may have a higher risk premium than a secured loan or provide a lower return. Furthermore, loans are subject to high default rates during adverse economic conditions. In addition, the value of future loan repayments must be discounted by the erosive effects of inflation as measured by the Retail Prices Index for example.

Attempts to securitize mortgages for the UK financial market have not proved successful, this results in low levels of liquidity and hence higher risk for lending organisations which specialise in the provision of mortgages and other long term personal debt.

The object of the present invention is to provide an alternative industrial process implemented on a data processing system for initiating and administering a range of financial products, particularly an income bonded loan which overcomes the disadvantages of the

4

conventional prior art processes. This process forms a
third industrial process within the financial services
industry alongside debt and equity and provides an
alternative to purely debt based borrowing.

5

This invention provides an operatively interconnected
data processing system for initiating and administering
a range of financial products wherein the compensation
for the use of funds is repaid by a predetermined
10 percentage of future income rather than by an interest
rate whether fixed or variable.

According to the present invention there is provided a
data processing system for initiating and managing a
15 loan, pension or other financial product where capital
is transferred from a lender to a borrower, which loan
is to be repaid over a term, which system comprises:

(i) means for logging personal data into a personal
20 database, which data comprises one or more predetermined
relevant indicators of the borrower's future income
profile;

(ii) means for estimating the borrower's future income,
25 which means comprises a database of reference income
profiles for a plurality of borrower categories, each
profile individually identifiable by its characteristic

5

reference indicator(s), and means for matching or approximating the relevant indicator(s) with each reference indicator or indicators thereby to arrive at an income profile most suited to the customer for the

5   period of the product;

(iii)   means for computing a predicted payment schedule over the period, which schedule comprises a plurality of predicted payment events, the amount to be

10   paid at each event being calculated as a percentage value of the customer's estimated instantaneous income at about the time that the repayment is to be made; the system further comprising;

15   (iv)   means for logging the customer's actual income during the term of the contract and demanding payment events from the customer, each payment comprising the predicted percentage value of the borrower's actual income rather than the predicted income, whereby the

20   actual payment comprises a proportion of the borrower's actual income during the period of the contract.

In an embodiment of the invention used to produce a loan, the percentage value predicted to be repaid may be

25   calculated to repay the loan compensation while the capital portion is repaid by a separate financial instrument.

6

Alternatively, the percentage value predicted to be repaid may be calculated to repay both the capital and compensation during the term.

5.   The compensation to be repaid may be adjusted over the term according to any known economic prediction model or forecast which is made when actual repayments have been made.

10   In one aspect of the invention, the percentage of the borrower's income forming a repayment at each payment event may be a fixed percentage during the term of the loan.

15   In another aspect of the invention the percentage of the borrower's income forming a repayment at any payment event may vary according to the contract. For example, the percentage may be adjusted up or down during the loan period as a predefined event or as a response to a set
20   of predefined circumstances.

The reference database may comprise data indicative of the probability of variation from the predicted income profile for each borrower category, the percentage value
25   or total amount to be repaid being adjusted to increase where the probability of variation increases, thereby compensating for perceived risk.

7

In an embodiment of the invention used to produce a pension or other savings product in addition to the loan, the predicted payments may be used to establish a fund, administered according to the contract, which pays in one
5   aspect a lump sum, in another aspect an income, which is predefined either as an absolute value or as a function of an absolute value and one or more economic indicators. For example, the percentage payments produce a fund which pays an annuity equal to a multiple of the customer's
10   initial income adjusted for inflation as measured by the Retail Price Index plus one percent.

The actual income may consist of taxable income or income after tax, or may exclude income subject to specified
15   taxes such as inheritance tax.

The actual payments may be subject to a ceiling and/or floor thereby to provide maximum and/or minimum payments at the payment events, or banded, thereby producing a
20   ceiling which will limit the maximum payments for loan compensation purposes and establish an start level at which payments are made into a pension or savings plan, and a floor which will establish a limit to the minimum payment value and trigger the draw down of previous
25   payments above the ceiling to make up the shortfall between the actual level of percentage repayments and the minimum level of payments specified in the band.

8

Preferably the data processing system may comprise a computer or computer network programmed to carry out the calculations required and to store the data required.

5   The present invention provides a process for producing financial products which: in the embodiment of an income bonded loan will allow borrowers to access their future income whilst insulating them from interest rate volatility and providing the security offered by the

10   knowledge that whether their income rises or falls their loan repayments will remain at a predetermined percentage of income; and in the embodiment of an income bonded pension or savings plan will allow savers to guarantee the future value of their savings regardless of the

15   amount which they actually contribute to the plan. Financial product retailers will receive payments which are only weakly linked to interest rates and which are likely to grow faster than the rate of inflation and pay inflation, thus acting as a hedge against the interest

20   rate volatility and/or uncertain returns on equity of their other investments.

The main advantages of the invention for the customer are:

25

The loan amount can be based on the whole income which is expected to be earned over the loan period, not

9

current income alone.

Loan repayments can be predictable as a percentage of income over the life of the loan so they will always be

5   affordable.

The customer can be insulated from the effects of the economic cycle.

10   A pension or savings plan may be combined with the loan with the proceeds predefined in such a way that they are also protected against adverse economic conditions.

The main advantages of the invention for the financial

15   product provider are:

The payments received are likely to outperform inflation and pay inflation and are as a result likely to be particularly attractive to providers of pensions and

20   annuities.

The payments will generally increase when interest rates fall and decrease when interest rates rise thus providing a useful hedge facility.

25

The characteristics of the income bonded loan which make it suitable as a hedge against interest rates offer an

10

improved opportunity for the securitization of the loans and thus provide improved liquidity and hence lower risk for the lending institution.

5   The capital repayments may be made as part of the income percentage repayments or a separate financial instrument may be used or the amount may be amortized over the loan period.

10   The income on which repayments are based may be defined in several ways, for example;   that income which is subject to one or more taxes or that income which remains after income taxes are deducted. The predetermined percentage of income is not necessarily fixed at one
15   level for the entire loan period; for example the contract may stipulate that the borrower repays 20% of income in the first five years, 15% in the second five years and 10% for the last five years of a fifteen year loan.
20

The loan compensation may be established as a combination of interest rate determined payments and repayments by percentage of income.

25   A ceiling and floor to the repayments may be set, or a band of repayments may be used whereby for example if income reduces below or increases above a predetermined

11

level the loan repayments remain at a constant value.

The loan may be secured against an asset or assets.

5   When a sufficient number of loans have been made the
     lender may securitize the loan repayments for sale and
     resale on the primary and secondary financial markets.

     The loan may be combined with a pension or other
10   investment vehicle, preferably by increasing the
     percentage of income which is paid to the lender. The
     amount which is devoted to the investment may be fixed
     or variable depending upon whether the compensation
     repayments are within the floor and ceiling band
15   established in the contract. For example, if the
     compensation repayments fall below the agreed floor, the
     lender may draw income from the investment in order to
     make up the difference, or if the loan compensation goes
     above the agreed ceiling the lender will add the excess
20   to the investment plan. This embodiment of the invention
     has the additional benefits of reducing risk for the
     lender and providing a high probability of a lump sum or
     pension at the end of the loan period for the borrower.

25   In the drawings:-

     Figure 1 is a flow diagram showing the tasks to be

12

carried out by a data processing system in performing an embodiment of the present invention.

Figure 2 is a table showing a predicted income profile and repayment schedule, along with examples of actual repayment events.

Figure 3 is a graph showing a distribution of incomes at a particular period forming an element of actual income profiles in a particular employment category.

On application for a loan an individual is assessed and a prediction of his or her future income is made. The repayments necessary to provide compensation for the loan are calculated based on the repayment of the debt at a predetermined percentage of future income. The percentage may change over the course of the loan but must be fixed at the outset although the contract may permit subsequent review of this percentage under predefined circumstances.

An offer is made to the borrower who contracts to repay an agreed percentage of income as compensation for the use of the funds to be lent. A separate financial instrument may be set up to repay the capital. If the borrower accepts the provisional offer, the details which he or she has submitted are verified and a credit check

13

using a credit reference agency would likely be carried out. If all is in order the loan amount is paid to the borrower who then starts to make repayments based on the agreed repayment schedule.

5

The income based repayments are reviewed at regular intervals to ensure that the correct amount of money is being repaid. This may take the form of an annual submission of a copy of the individual's income tax

10   return. If the individual has no income for a period then no repayments are made unless a base repayment figure has been agreed on in the original contract, for example, provision may be built into the lending agreement that household income may be taken into account in calculating

15   repayments. If the individual's income increases by a great amount, there may be repayment ceilings built into the contract to ensure that the loan repayments are not disproportionate to the amount of the original loan. A variety of other risk reduction business methods may be

20   employed in using the invention such as a mixed loan repayment system where part of the compensation is repaid at fixed or variable interest rates and part as a percentage of income.

25   If the loan capital is repaid early, the loan agreement will make provision for the potential loss suffered by the lender. This may consist of a penalty payment for

14

early redemption, or the retrospective conversion of the loan to one based on a rate of interest at a pre-agreed premium to central bank minimum lending rates or other benchmark financial product.

5

If the client suffers serious injury or death during the term of the loan a preset table of early redemption payments may be used to determine the due compensation to the lender which may be covered by an insurance
10   policy.

At the end of the agreed loan period income based repayments stop regardless of the value of the repayments made. Should the borrower wish to take out subsequent
15   loans he or she will be able to do so by committing a further percentage of income, although the lending organisations may wish to put a cap on the percentage of income which may be allocated for repayments depending on factors such as the borrower's age.

20

The lender may securitize the debt and sell the product on the primary financial market. The debt may be securitized in many ways by splitting interest and capital repayments or by predictions of repayments at
25   particular times or by predictions of conversion to other types of financial instrument.

15

Specific embodiment.

A hypothetical borrower, "Andrew Smith", is seeking a
loan of £100,000 to purchase a house. The embodiment
5   includes the core elements of the estimate of future
income and the repayment of the loan based on a
predetermined percentage of the borrower's actual future
income. FIGURE 1 provides an overview of the data
processing which is carried out. In the following
10   description the reference numerals in the figure are
referred to by corresponding numbers in brackets.

Step 1.
The loan applicant fills out an application form (1)
15   (various means may be used for this; for example, by
telephone, on paper or on the Internet) and provides the
following details which are input into the Individual
Account Data Store (2): (the lending organisation's
method of doing business will determine exactly what
20   details are required for a statistically reliable
assessment.)

16

TABLE 1	
Name	Andrew Smith
Age	25
Gender	Male
Educational qualifications, awarding bodies and grades	BSc Information Technology Manchester University 2:2
Address	Officers Mess, Wood Barracks, London
Name of employer	British Army
Workplace address	1 Loamshire Regiment Wood Barracks London
Job Title	Captain
Category of employment	Armed Forces (Officer)
Length of service in current employment category	3 years
Purpose of loan	House Purchase
Security to be offered (if any)	The house to be purchased
Loan Required	£100,000
Period of the loan	25 years
Value of the security	£100,000
Other information relevant to the loan	Nil

Step 2.

The applicant's details are now compared with an External

Income Data Store (3) (the data in this specific example

has been extracted from the 1998 Report of The Armed

17

Forces Pay Review Body) in order to predict future income

(4) to identify how he compares with his peer group. In

this case the peer group is that of Armed Forces

(officers) of similar biographical details. A simulated

5   extract is presented here. The applicant's details are

in the first row in this example. The comparator data in

this case is selected from those at one level above or

below the applicant's educational level; degree subject

rating; age; employment category and length of service,

10   and at the same level as his geographical location and

of the same sex. The income of each comparator is listed

in the left hand column. The table lists only a sample

of the data which is available. The skilled person will

be aware that actual reference datasets will need to be

15   representative of a statistically significant number of

records. The relevance of each field in the record is

weighted according to its importance as an indicator of

future income. Appropriate weighting may be achieved by

the production of a computer neural network trained by

20   means of actual raw data comprising a range of

indicators. The relevance of each will be apparent from

the weighting functions associated with each node and/or

path in the network.

Table II

Incomes	Education level	Sub-ject	Grade	Establ-ishment	Age	Sex	Loca-tion	Job Title	Length of service in employment category	Employment Category
25,000	Voc 3	3	3	2	25	1	1	Capt	36	1
25,000	Voc 3	2	3	2	25	1	1	Capt	36	1
25,000	Non-Voc 3	2	3	1	25	1	1	Capt	36	1
25,000	Voc 3	3	2	1	25	1	1	Capt	36	1
25,000	Non-Voc 3	3	3	3	25	1	1	Capt	36	1
25,000	Non-Voc 3	3	3	1	25	1	1	Capt	36	1
25,000	Non-Voc 3	3	3	2	25	1	1	Capt	36	1
25,000	Voc 3	5	3	2	25	1	1	Capt	36	1
25,000	Voc 3	3	3	3	25	1	1	Capt	36	1
24,500	Non-Voc 3	4	3	3	25	1	1	Capt	36	1
24,500	Non-Voc 3	3	2	2	25	1	1	Capt	28	1
24,500	Non-Voc 3	3	3	2	25	1	1	Capt	28	1
24,500	Non-Voc 3	4	3	1	25	1	1	Capt	28	1
24,500	Voc 3	2	3	2	25	1	1	Capt	28	1
24,500	Voc 3	3	3	2	25	1	1	Capt	28	1
24,500	Voc 3	3	3	2	25	1	1	Capt	28	1
25,500	Voc 2	2	2	3	25	1	1	Capt	36	1
25,500	Non-Voc 2	2	2	2	25	1	1	Capt	36	1
25,500	Non-Voc 2	2	2	3	25	1	1	Capt	36	1
25,500	Non-Voc 2	2	2	3	25	1	1	Capt	36	1
25,500	Non-Voc 2	2	2	3	25	1	1	Capt	36	1
25,500	Voc 2	2	2	4	25	1	1	Capt	36	1
25,500	Voc 2	2	2	2	25	1	1	Capt	36	1
26,000	Voc 2	2	2	2	25	1	1	Capt	42	1

19

Step 3.   The data set relating to comparators one year older than the applicant is queried in the same way as Step 2. This process is repeated for the data sets relating to comparators at each age up to the age the applicant will be at the end of the loan period. This data is used to produce, by a statistical analysis, using selected income risk variables (6), an estimated future income profile as shown in table 111 below:

TABLE III

Age	Income £ per annum
25	25583
26	26276
27	26970
28	27663
29	28357
30	29050
31	32441
32	33244
33	34047
34	34850
35	35653
36	36456
37	37259
38	38062
39	38865
40	45767
41	45767
42	46972
43	46972
44	48176
45	48176

20

46	49381
47	49381
48	50585
49	50585

5

The statistical analysis may take many forms and will depend on the business methods used by the lending organisation. As an example, the following process may be used in each distinct category:

10

1.   Formulate a data set comprising a distribution of incomes in that category at each period between repayment events. Each distribution shown graphically is likely to resemble the distribution

15   shown in figure 3 for each period calculated. This will result in a series of distributions representing the spread of incomes about a median for a particular income profile.

20   2.   Identify the current income of the applicant on the first graph in the income profile series and assign an income percentile to this value.

3.   Identify the same percentile for all graphs to

25   produce a predicted income profile for that person.

4.   Call the deviation range about the median a risk variable σ.

21

5. Examine the data set to confirm that all future periods have an acceptable value of σ. σ is the distance from the median income of the graph to a value whereby a line drawn through the graph at that distance on either side of the centre line will encompass a percentage of the individual incomes which is defined in the Income Prediction Risk Variables Data Store (6). Such percentage being an assessment of the size of risk which the lending institution is prepared to accept. As the majority of 25 year old Army officers are paid the same amount of money the σ for this applicant's vocational group is very small indicating a low level of risk. The income of 25 year old commodities traders may have a very large σ indicating that income predictions will be very uncertain and thus of much greater risk.

6.Confirm that the loan applicant's percentile "x" falls within the σ range for each graph.

7.Calculate the income volatility (Δ) over time of the vocational sector using the data in the External Income Data Store (3). The income volatility has three components, Δ_1 which is the uncertainty of an individual income over time; in other words, the extent to which the income location of an individual moves on the graph over time. In this example, which relates to an Army Officer, there is very little uncertainty because his income will

22

not reduce so long as he remains employed by the Army, nor will it increase other than according to the annual and promotion increments which are found in the External Income Data Store (3). The income of a self-employed

5   computer consultant will have a much greater volatility for example since his or her income will be determined by a wider range of uncertain factors); Δ_2 which is the uncertainty associated with the vocational sector over time ie the relative movement of salaries within an

10   industrial sector. For example, the relative value of teachers' pay has reduced over the last 25 years in the United Kingdom compared to that of similarly qualified training managers. The third component Δ_3 is the uncertainty associated with the individual remaining

15   within the comparator data set or leaving it. For example by changing industry sector or suffering death or serious injury. This figure is also obtained from the External Income Data Store (3).

8. Confirm that income volatility is within the value of

20   Δ specified in the Income Prediction Risk Variables Data Store.

9. Select the maximum acceptable percentile range where the Δ has the lowest value consistent with the risk policy decision held in the Income Prediction Risk

25   Variables Data Store.

10 Establish the average salary of the percentile range for each graph.

23

11. Tabulate these figures (as in table 1 above) for printed output as part of the Loan Administration Process (11) and store them in the Internal Income Data Store (7).

Step 4.

The next step is to factor in to the estimate of future pay the amount by which actual pay will rise in the future. This information takes the form of two variables: (i) the predicted rate of inflation and (ii) the extent to which pay rises will exceed inflation, both determined by the Risk Analysis Variables Process (5) using data from the Economic Statistics Data Store (16) and extracted from the Income Prediction Risk Variables Data Store (6). The determination of these variables will be the responsibility of the lending organisation and will constitute a professional judgement.

In this case we will use historical data; the average inflation rate as indicated by the UK Retail Price Index over the five years from Jan 94 to Jan 99 (2.69%) and the gap between inflation and rises in average earnings as published by the UK Office of National Statistics over the same period (1.17%). These two variables are added together and used to calculate the predicted future income of the applicant using the standard formula for the future value of £1:

24

$$£1=(1 + r)^n$$

Where n is the number of years the income will be received in the future and r is the discount rate, in
5   this case the sum of the two inflation variables; 3.86%.-

This produces table IV of predicted future income adjusted for inflation and annual inflation linked pay rises which is stored in the Internal Income Data Store
10   (7):

TABLE IV

Age	Income £ per annum
25	25583
26	27290
27	29092
28	30992
29	32995
30	35107
31	40718
32	43336
33	46096
34	49005
35	52069
36	55297
37	58696
38	62276
39	66044
40	80775
41	83893
42	89425
43	92877
44	98935

15

20

25

30

25

45	102754
46	109389
47	113612
48	120874
49	125540

Step 5.

The next step is to calculate the risk discount to be used to establish the present value of the applicant's future income. The risk discount in this case comprises the following factors which are extracted from the Income Prediction Risk Variables Data Store (6) although the model of risk used will be proprietary to the lending organisation:

(i)   The Δ

(ii)   The σ

(iii)   The risk that the applicant will commit fraud or default.

(iv) The risk that the applicant will repay the mortgage early and hence produce the return specified by the early redemption conditions.

(v) The risk that interest rates will be much higher than estimated and hence the returns will be greater than using the income bonded loan system.

The skilled person will be aware that there are many mathematical methods available for calculating these

26

risks and the lending organisation will select the method
in which it has most faith. In this example a risk
discount of 1% greater than that used for a standard
variable interest rate mortgage will be used. The
5   comparator tables used to predict future income in steps
2 and 3 will already have taken into account the
possibility of lower or higher than expected repayments.
It will be a condition of this loan that it is secured
against the property, that life assurance is taken out
10   to the value of future predicted income repayments at the
date of death and that early repayment will incur a
compensating penalty. Different applicants may have
different conditions attached to their loans which will
be established in the loan administration process (11).
15   The 1% factor represents the risk discount associated
with the introduction of a new financial product to the
market.

Step 6.
20   Having computed the applicant's predicted future income,
the percentage of income necessary to compensate for the
use of the lender's funds is now computed (8).

The present value of the interest repayments on a
25   standard mortgage (for the same loan sum) offered at a
variable interest rate by a major competitor of the
lending institution is calculated or extracted from the

27

External Market Data Store (9). The calculations are done
using industry standard mathematical techniques.

5   The present value of the interest repayments on a
£100,000 mortgage assuming an average interest rate of
8% and a risk discount rate of 7% are: £93,229.

The percentage of income necessary to provide repayments
which have an equal present value to the repayments on
10   the quoted standard mortgage are then computed using the
data in the Internal Income Data Store (7): For this
customer it is 17.043%. From this the annual repayments
necessary to service the debt on a competitive basis,
based on the prediction of future income can be
15   calculated. This represents the calculation to establish
the price point at which the loan will be offered. The
results of these calculations are shown in table V below:

TABLE V

20

Year	Annual interest repayments on £100,000 @ 8 %	Present Value of mortgage repayments @ discount rate of 7%	IBL annual predicted repayments on £100,000 @ 17.043%	Present value of IBL annual repayments @ discount rate of 8%
1	8000	7477	4360	4037
2	8000	6988	4651	3988
3	8000	6530	4958	3936
4	8000	6103	5282	3882
5	8000	5704	5623	3827
6	8000	5331	5983	3770
7	8000	4982	6940	4049
8	8000	4656	7386	3990

25

28

10	8000	4067	8352	3869
11	8000	3801	8874	3806
12	8000	3552	9424	3743
13	8000	3320	10004	3678
14	8000	3103	10614	3614
15	8000	2900	11256	3548
16	8000	2710	13767	4018
17	8000	2533	14298	3864
18	8000	2367	15241	3814
19	8000	2212	15829	3668
20	8000	2067	16862	3618
21	8000	1932	17512	3479
22	8000	1806	18643	3429
23	8000	1688	19363	3298
24	8000	1577	20601	3249
25	8000	1474	21396	3124
Totals	200,000	93229	285076	93229

Clearly the borrower's estimated predicted repayments are expected to be greater under the income bonded loan than under a standard mortgage loan. This extra cost is offset by the lower future value of repayments because of their erosion by inflation, the relatively higher value of the early repayments which are lower in absolute terms than those of the comparable mortgage, and the increased capital gains which the borrower will receive from the probable rise in value of the mortgaged property.

In this example, the borrower may only be able to borrow three times income under a standard mortgage agreement and thus buy a home at a price of £75,000. The difference in value of this home and the home which may be afforded with the income bonded loan assuming a house price inflation rate of 5% over the loan period is c£75,000, substantially offsetting the additional cost of the

29

income bonded loan. An additional benefit which is apparent is that the borrower is expected to pay less than the comparator mortgage in annual repayments for the first nine years of the loan.

Step 7.

In this case the applicant wishes to use an endowment policy to repay the loan capital. The details of the policy are acceptable to the lender who confirms the validity of the policy with the issuer (10). It would be equally possible for Mr Smith to amortize the loan amount over the loan period or to purchase an appropriate financial product from the lender (10a).

Step 8.

The lender makes a conditional offer of a loan (11) of £100,000 to Mr Smith, the principal to be repaid by an endowment policy and the interest to be repaid by monthly payments of 17.043% of Mr Smith's income (in this example the percentage selected is estimated to provide the same return as the comparator mortgage but the lending organisation may add a premium or a discount depending on their marketing policy and business methodology). The loan is conditional upon Mr Smith taking out a life assurance policy sufficient to pay the outstanding balance of the expected income repayments in the event of Mr Smith's death, and on the verification of the

30

details which have been submitted including the valuation
of the property on which the principal is secured. In
this instance it is agreed that if Mr Smith wishes to
repay the loan early he will incur a redemption penalty

5   equivalent to the repayments which would have been made
over the term of the loan had he taken out a variable
rate mortgage at 1% above the lending institution's
standard quoted rate. Such repayments to be compounded
at the same rate of interest.

10

Step 9.

The offer is accepted, the parties sign an agreed
contract and the loan amount is transferred to Mr Smith's
account (11).

15

Step 10.

One month after the loan has been agreed Mr Smith makes
his first repayment according to the schedule which has
been outlined in the contract. The repayments are

20   received (13) and compared against the predicted
repayments. Where appropriate the Internal Income Data
Store (7) is modified and the Predicted Future Income
held in the Individual Account Data Store (2) is updated
based on the outcome of the predictions made in the Risk

25   Analysis (5). The repayments continue in line with the
predictions made by the lending organisation which
verifies his income details annually (14). At the end of

the 25 year period Mr Smith receives the title to his house and his obligation to the lender is discharged (11). There are innumerable alternatives to this scenario. The actual repayments which Mr Smith makes

5   might be in line with one of the columns shown in figure 2 which postulates several scenarios which might be followed; i.e. early redemption (year 8), death with insurance (at year 8), 1 year's unemployment during the repayment schedule (year 11) and early promotion (year

10   11)

Step 11.

The lending organisation groups Mr Smith's loan with a statistically significant number of others of similar

15   risk and securitizes the asset (12) through the normal channels in the country of business. In this case the asset is securitized with a number of others as a $200,000,000 10 year bond paying an annual income of 5% according to the variables produced by the risk analysis

20   process (5) and held in the Securitization Risk Variables data store (15). In 10 years' time the second 10 year tranche of bonds within which Mr Smith's mortgage is securitized is sold, this time with a coupon of 10% reflecting the changed market conditions. The final five

25   year maturity bonds are sold at yet a higher price reflecting the increased repayments and lower risk of the underlying asset. These figures are purely for

32

illustration, the coupon and yield are determined by the price the market is prepared to pay for the asset. In an alternative embodiment, the mortgages could be securitized as a 25 year £200,000,000 fund producing a guaranteed income of £8,000,000 per annum guaranteed to increase at the rate of inflation plus 1% annually. The capital to be paid in full at the end of term.

33

CLAIMS

1. A data processing system for initiating and managing
a loan, pension or other financial product where capital
5   is transferred from a lender to a borrower, which loan
is to be repaid over a term, which system comprises:

(i)   means for logging personal data into a personal
database, which data comprises one or more predetermined
10 relevant indicators of the borrower's future income
profile;

(ii)   means for estimating the borrower's future
income, which means comprises a database of reference
15 income profiles for a plurality of borrower categories,
each   profile   individually   identifiable   by   its
characteristic ·reference indicator(s), and means for
matching or·approximating the relevant indicator(s) with
each reference indicator or indicators thereby to arrive
20 at an income profile most suited to the customer for the
period of the product;

(iii)   means for computing a predicted payment
schedule over the period, which schedule comprises a
25 plurality of predicted payment events, the amount to be
paid at each event being calculated as a percentage value
of the customer's estimated instantaneous income at about

34

the time that the repayment is to be made; the system further comprising;

(iv)   means for logging the customer's actual income during the term of the contract and demanding payment events from the customer, each payment comprising the predicted percentage value of the borrower's actual income rather than the predicted income, whereby the actual payment comprises a proportion of the borrower's actual income during the period of the contract.

2.   A system as claimed in claim 1 wherein the percentage value predicted to be repaid is calculated to repay the compensation while the capital portion is repaid by a separate financial instrument.

3.   A system as claimed in claim 1 wherein the percentage value predicted to be repaid is calculated to repay the capital portion during the term while the compensation is repaid by a separate financial instrument.

4.   A system as claimed in claim 1 wherein the percentage value predicted to be repaid is calculated to repay both the capital and the compensation during the term.

35

5.   A system as claimed in any preceding claim wherein
the capital sum and/or compensation to be repaid is
adjusted over the term according to any known economic
prediction model or forecast which is made when actual
5   payments have been received.

6.   A system as claimed in any preceding claim wherein
the percentage of the borrower's income forming a
repayment at each payment event is a fixed percentage
10   during the term of the loan.

7.   A system as claimed in any of claims 1 to 5 wherein
the percentage of the borrower's income forming a
repayment event may vary according to a predefined event
15   or set of circumstances.

8.   A system as claimed in claim in claim 7 where the
percentage is ramped upwards or downwards as a function
of the term of the loan.

20

9.   A system as claimed in any preceding claim wherein
the reference database comprises data indicative of the
probability of variation from the predicted income
profile for each borrower category, the percentage value
25   or total amount to be repaid being adjusted to increase
where the probability of variance increases, thereby
compensating for perceived risk.

36

10.   A system as claimed in any preceding claim wherein
the actual income consists of a gross taxable income or
that income which is exempted from specific taxes.

5   11.   A system as claimed in any preceding claim wherein
the actual repayments may be a subject to a ceiling
and/or floor to provide maximum and/or minimum repayments
at the repayment events.

10   12.   A system as claimed in any preceding claim wherein
the actual repayments may be used to provide a savings
plan or pension if a preset repayment ceiling is
exceeded.

15   13.   A system as claimed in any preceding claim wherein
the actual repayments above the repayment ceiling may be
stored to compensate the lender for any future payments
which fail to be equal in value to a predetermined
repayment floor.

20

14. A system as claimed in any preceding claim and
comprising a computer or computer network programmed to
carry out the calculations required and store the data
required.

1/3

Fig.1 - Overview of
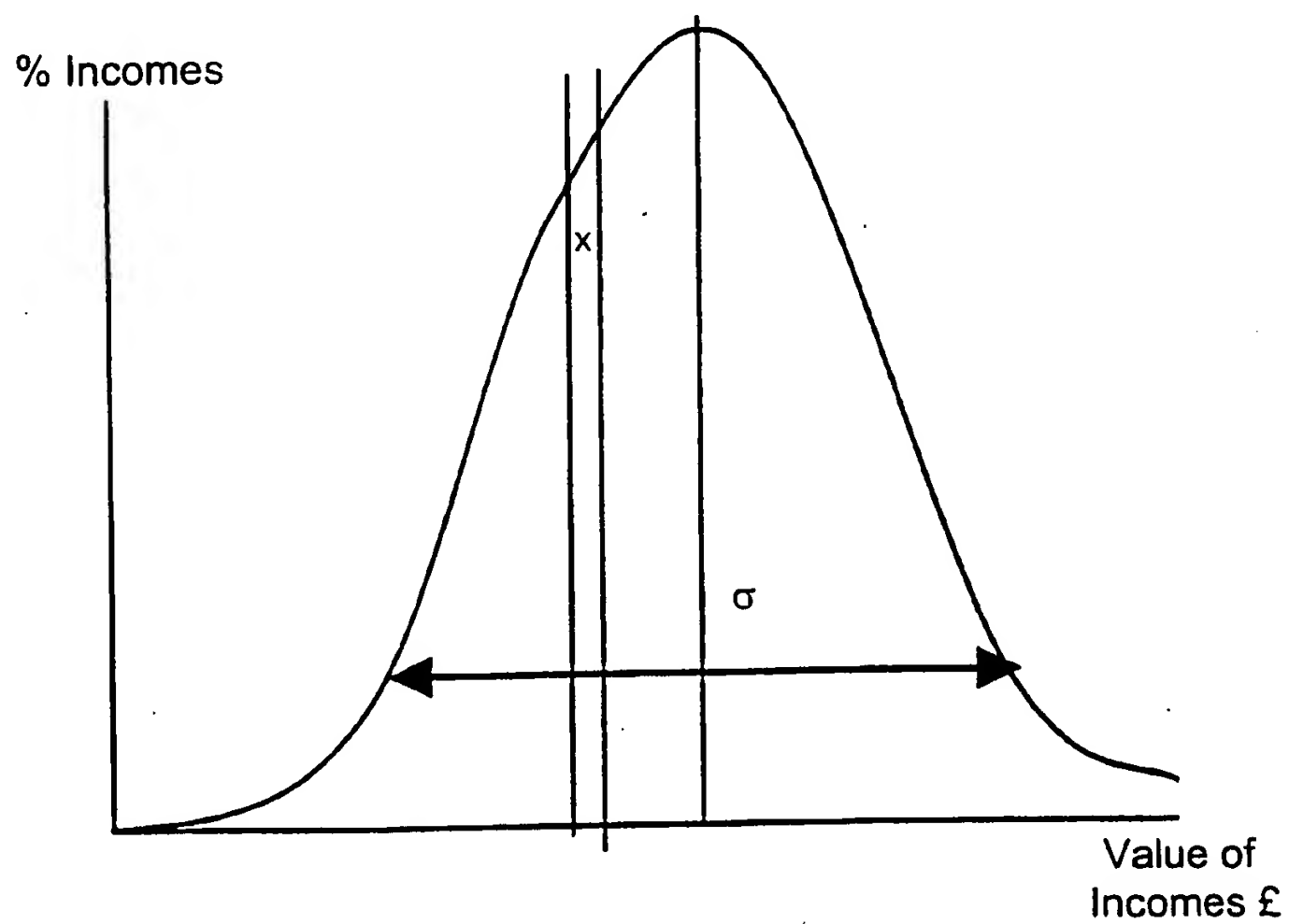Income Bonded Loan Data
Processor Flow Diagram
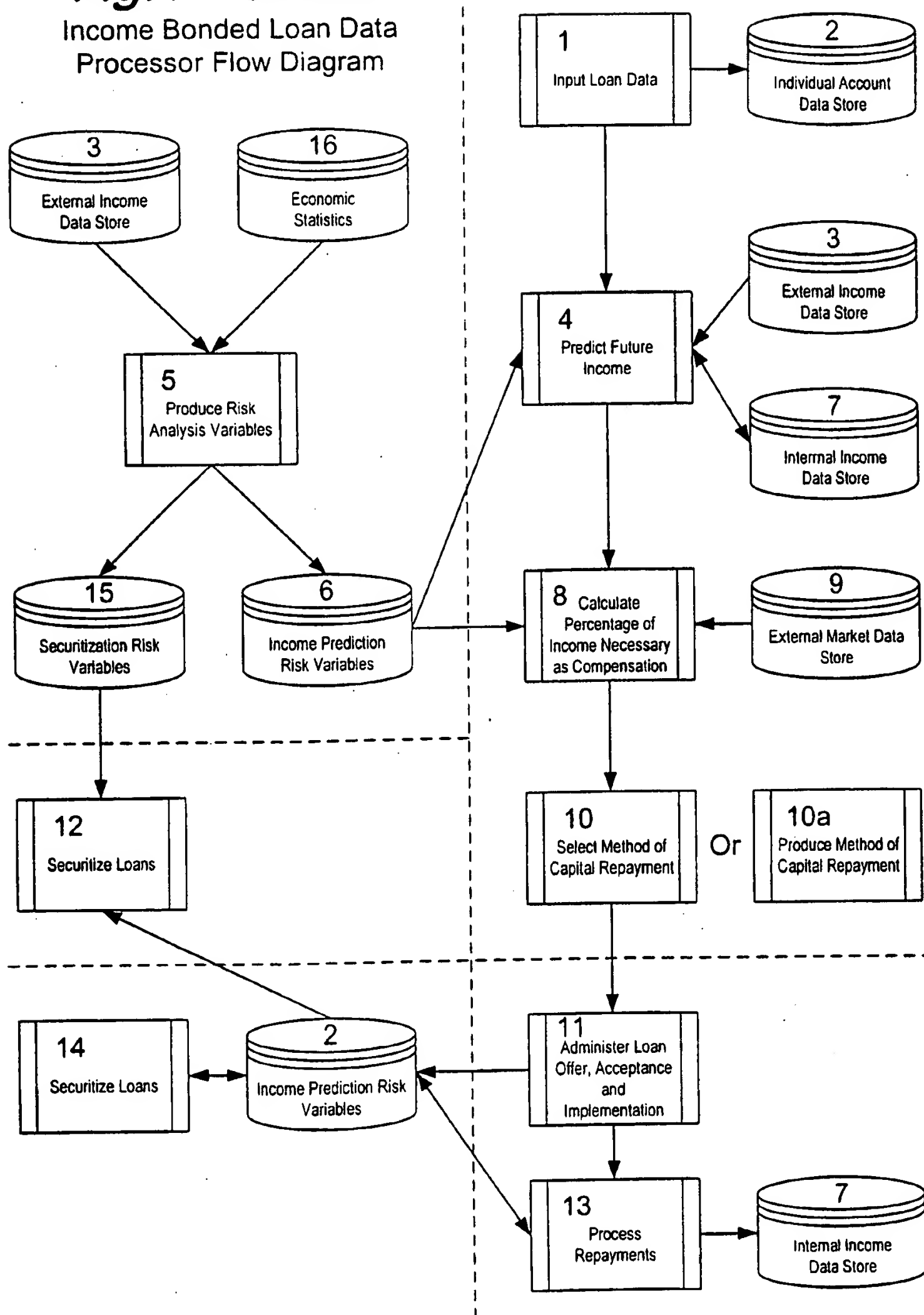
Fig.2 - Example Table of Predicted Income and Repayments

Year	Predicted Future Income	Predicted Compensation Repayments on Loan of £100,000 @ 17.04% of Income	Actual Repayments (Early Redemption)	Actual Repayments (Death during Loan Period)	Actual Repayments (1 year unemployed)	Actual Repayments (Early Promotion)
1	25583	4359	4359	4359	4359	4359
2	27290	4650	4650	4650	4650	4650
3	29092	4957	4957	4957	4957	4957
4	30992	5281	5281	5281	5281	5281
5	32995	5622	5622	5622	5622	5622
6	35107	5982	5982	5982	5982	5982
7	40718	6938	6938	6938	6938	6938
8	43336	7384	27429	27429	7384	7384
9	46096	7855	Representing an early redemption penalty	Representing the insurance payment	7855	7855
10	49005	8350			8350	8350
11	52069	8873			0	11699
12	55297	9423			8684	12151
13	58696	10002			9227	12952
14	62276	10612			9799	13452
15	66044	11254			10402	14330
16	80775	13764			11036	14883
17	83893	14295			11704	15844
18	89425	15238			14315	16456
19	92877	15826			14867	17507
20	98935	16858			15848	18183
21	102754	17509			16459	19092
22	109389	18640			17533	20047
23	113612	19359			18210	21049
24	120874	20597			19386	22102
25	125540	21392			20134	23207
Totals		285023	27429	27429	258985	314335

Fig.3